# PENSION SECTION NEWS

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## Chairperson's Corner

*by Donald J. Segal*

My comments about the pension actuary being viewed as a "hired gun" by governmental agencies have generated some response (See "Letter to the Editor" on page 2). Upon reflection, I wonder if we are that different from other professionals. Do not lawyers and accountants seek to serve their clients in the best way possible? In each case, the professional has a responsibility to make sure that his/her client is adhering to the law while, at the same time, seeking every possible favorable application of the law. We need only remember a recent, highly publicized criminal trial to observe the efforts by a professional to gain the most favorable outcome for his client. Was he being unprofessional?

Advocacy of a position (whether or not it is popular with the regulatory agencies) should not be confused with lack of professionalism. Perhaps we should ask why we are at times viewed negatively by regulatory agencies when, in fact, we are doing what we were hired to do. One solution being worked on by the actuarial professional through the American Academy of Actuaries is more input into the rule-making process.

*continued on page 2, column 3*

## Earn More, Live Longer—Variation in Mortality by Income Level

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*by Michael R. Virga*

One question of considerable interest in pension plan valuations is how mortality varies depending on the characteristics of the population being covered, such as union versus salaried or blue-collar versus white-collar. One possible measure that could be used as a basis of assigning different levels of mortality to different populations is the amount of the annuity or, alternatively, the amount of indexed final salary.

The following tables show mortality rates for nondisabled annuitants under the Civil Service Retirement System (CSRS) who retired with an immediate (nondeferred) annuity.[1] The data in Tables 1-6, which cover fiscal years 1988 through 1994, were collected for the five levels of indexed monthly annuity and indexed final salary shown in the next column.

| Monthly Annuity Levels | Salary Levels |
|---|---|
| < $1,000 | < $30,000 |
| $1,000–$1,500 | $30,000–$40,000 |
| $1,500–$2,000 | $40,000–$60,000 |
| $2,000–$3,000 | $60,000–$80,000 |
| > $3,000 | > $80,000 |

Federal employees are not covered by Social Security but are covered by CSRS. Consequently, CSRS is designed to serve as a combination of Social Security and an employer-provided pension. Therefore, when the findings in these tables are compared to other plans, it would be appropriate to add Social Security to the plan's pension.

Table 1 on page 7 shows the mortality rates for five-year age groupings for each of the five levels of monthly annuity. Also shown is the average mortality rate for all amount levels combined, where the averages are weighted by number of lives (rather than weighted by amounts). Annuities under CSRS are fully indexed by the CPI. For purposes of these tables, in the case of deaths and exposures occurring before 1994, the indexing is extended to 1994 to bring all annuity amounts up to 1994 levels. Salaries are also indexed to 1994 levels using historical federal pay raises. In

*continued on page 7, column 1*

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[1] The experience data do not include federal employees who are covered under the federal employees retirement system (FERS). This system covers employees hired after 1983, plus a small number who elected coverage under FERS in 1987.

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**TABLE 1**
**Mortality Rates by Amount of Indexed Monthly Annuity for CSRS Annuitants**
**(Compared to Mortality Rates for Life Tables for U.S. Social Security Area—1990 and for CSRS Active Employees)**

| | Indexed Monthly Annuity | | | | | | Social Security | Active Employee |
|---|---|---|---|---|---|---|---|---|
| | <$1,000 | $1,000–$1,500 | $1,500–$2,000 | $2,000–$3,000 | >$3,000 | Average | | |
| **Male** | | | | | | | | |
| 57 | 0.0120 | 0.0108 | 0.0088 | 0.0070 | 0.0055 | 0.0084 | 0.0121 | 0.0048 |
| 62 | 0.0185 | 0.0162 | 0.0137 | 0.0113 | 0.0089 | 0.0136 | 0.0187 | 0.0066 |
| 67 | 0.0260 | 0.0249 | 0.0216 | 0.0182 | 0.0146 | 0.0216 | 0.0297 | 0.0086 |
| 72 | 0.0379 | 0.0371 | 0.0336 | 0.0289 | 0.0238 | 0.0329 | 0.0443 | 0.0131 |
| 77 | 0.0614 | 0.0608 | 0.0546 | 0.0468 | 0.0400 | 0.0531 | 0.0683 | |
| 82 | 0.0993 | 0.0986 | 0.0878 | 0.0781 | 0.0676 | 0.0866 | 0.1024 | |
| 87 | 0.1484 | 0.1521 | 0.1341 | 0.1237 | 0.1106 | 0.1352 | 0.1509 | |
| 92 | 0.2240 | 0.2326 | 0.2139 | 0.1787 | 0.1572 | 0.2087 | 0.2160 | |
| **Female** | | | | | | | | |
| 57 | 0.0060 | 0.0063 | 0.0057 | 0.0045 | 0.0045 | 0.0057 | 0.0067 | 0.0028 |
| 62 | 0.0103 | 0.0087 | 0.0078 | 0.0080 | 0.0089 | 0.0089 | 0.0108 | 0.0033 |
| 67 | 0.0136 | 0.0134 | 0.0124 | 0.0115 | 0.0078 | 0.0130 | 0.0166 | 0.0043 |
| 72 | 0.0194 | 0.0208 | 0.0203 | 0.0184 | 0.0189 | 0.0198 | 0.0252 | 0.0077 |
| 77 | 0.0339 | 0.0340 | 0.0322 | 0.0306 | 0.0265 | 0.0330 | 0.0393 | |
| 82 | 0.0593 | 0.0587 | 0.0533 | 0.0502 | 0.0442 | 0.0566 | 0.0632 | |
| 87 | 0.1022 | 0.0984 | 0.0866 | 0.0829 | 0.0784 | 0.0962 | 0.1051 | |
| 92 | 0.1753 | 0.1605 | 0.1550 | 0.1417 | 0.1281 | 0.1655 | 0.1698 | |

## Earn More, Live Longer

*ontinued from page 1*

Table 1, a comparison is shown with the mortality rates from the "Period Life Tables for the U.S. Social Security Area by Calendar Year and Sex—Calendar Year 1990" from *Actuarial Study 107, Life Tables for the United States Social Security Area 1900–2080* by the Office of the Actuary at the Social Security Administration. These rates reflect the experience for the entire population covered by Social Security, including active employees and disabled and nondisabled annuitants. Also shown in Table 1 are the mortality rates for active CSRS employees at ages 57 through 72.

Table 2 on page 8 shows the ratios of the mortality rates in Table 1 to the average rate for CSRS annuitants at each age band and also these ratios for Social Security and active CSRS employees.

Table 3 on page 8 lists mortality rates analogous to those given in Table 1, except these rates are for each level of indexed final salary (rather than for the level of monthly annuity). Table 4 on page 9 presents the ratios of the mortality rates shown in Table 3 to the average mortality rate for CSRS annuitants at each age band.

The mortality rates decline significantly, both as the amount of the annuity increases and as the amount of indexed final salary increases. For male lives at the younger ages, the mortality rates at the highest amount levels are about one-half the mortality rates at the lowest amounts. The spread in mortality rates between highest and lowest amount levels declines at the older ages and is less pronounced for female lives. Also, the mortality rates for the lowest amount levels are generally less than the mortality rates for Social Security, while the rates for the highest amount levels are still considerably greater than the rates for active CSRS employees. Mortality rates for active employees are typically lower than the rates for retired employees in the same age groups. One reason is that less healthy employees tend to retire earlier than healthier employees.

Table 5 on page 9 and Table 6 on page 10 present a joint distribution that shows how the mortality experience varies depending on both annuity and salary levels. These tables show the ratio of the mortality rate for each annuity/salary combination to the overall average mortality rate at that age. In determining these ratios, we first grouped the deaths and exposures for fiscal years 1988–1994 into five-year age bands and calculated the mortality rates and ratios for each age band. Then a weighted average of the ratios was determined for all age bands under age 76 and, similarly, for age bands greater than age 75. Combining the experience for different age bands was necessary to obtain sufficient exposure at each annuity/salary combination. However, for some of the annuity/salary combinations, the exposures are still relatively small, that is, less than 500 lives. The ratios for male and female lives are listed in Table 5 and the corresponding exposures (for fiscal years 1988–1994 combined) are given in Table 6.

These tables show, particularly for male lives, that for a given salary level, the ratios generally decrease as the amount of the annuity increases. Increases in the amount of the annuity imply an increase in service because the annuity is based on the high-3 average salary and is proportional to service. Thus, a lower mortality rate also seems to be asssociated with longer service; this would be consistent with the concept that the working population has lower mortality than the general population.

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### TABLE 2
### Ratios of Mortality Rates by Amount of Indexed Monthly Annuity to Average Mortality Rate for CSRS Annuitants for Each Age Group (Also Includes Ratios of Mortality Rate for Life Tables for U.S. Social Security Area—1990 and for CSRS Active Employees)

| | Indexed Monthly Annuity | | | | | Social Security | Active Employee |
|---|---|---|---|---|---|---|---|
| | <$1,000 | $1,000–$1,500 | $1,500–$2,000 | $2,000–$3,000 | >$3,000 | | |
| **Male** | | | | | | | |
| 57 | 1.434 | 1.287 | 1.050 | 0.840 | 0.655 | 1.438 | 0.572 |
| 62 | 1.360 | 1.190 | 1.005 | 0.826 | 0.654 | 1.371 | 0.483 |
| 67 | 1.203 | 1.152 | 1.001 | 0.840 | 0.676 | 1.373 | 0.396 |
| 72 | 1.153 | 1.129 | 1.022 | 0.880 | 0.723 | 1.349 | 0.398 |
| 77 | 1.156 | 1.146 | 1.029 | 0.881 | 0.754 | 1.286 | |
| 82 | 1.147 | 1.139 | 1.015 | 0.903 | 0.781 | 1.183 | |
| 87 | 1.098 | 1.125 | 0.992 | 0.915 | 0.818 | 1.116 | |
| 92 | 1.073 | 1.114 | 1.025 | 0.856 | 0.753 | 1.035 | |
| **Female** | | | | | | | |
| 57 | 1.049 | 1.094 | 0.996 | 0.783 | 0.779 | 1.175 | 0.480 |
| 62 | 1.157 | 0.972 | 0.873 | 0.900 | 1.001 | 1.204 | 0.373 |
| 67 | 1.044 | 1.025 | 0.953 | 0.885 | 0.596 | 1.275 | 0.329 |
| 72 | 0.980 | 1.048 | 1.023 | 0.926 | 0.951 | 1.267 | 0.388 |
| 77 | 1.026 | 1.029 | 0.974 | 0.926 | 0.804 | 1.189 | |
| 82 | 1.048 | 1.037 | 0.942 | 0.887 | 0.781 | 1.117 | |
| 87 | 1.062 | 1.023 | 0.900 | 0.862 | 0.815 | 1.092 | |
| 92 | 1.060 | 0.970 | 0.937 | 0.856 | 0.774 | 1.026 | |

### TABLE 3
### Mortality Rates by Amount of Indexed Final Salary for CSRS Annuitants (Compared to Mortality Rates for Life Tables for U.S. Social Security Area—1990 and for CSRS Active Employees)

| | Indexed Final Salary | | | | | | Social Security | Active Employee |
|---|---|---|---|---|---|---|---|---|
| | <$30K | $30–40K | $40–60K | $60–80K | >$80K | Average | | |
| **Male** | | | | | | | | |
| 57 | 0.0121 | 0.0098 | 0.0076 | 0.0064 | 0.0058 | 0.0084 | 0.0121 | 0.0048 |
| 62 | 0.0179 | 0.0151 | 0.0122 | 0.0101 | 0.0087 | 0.0136 | 0.0187 | 0.0066 |
| 67 | 0.0273 | 0.0228 | 0.0192 | 0.0164 | 0.0145 | 0.0216 | 0.0297 | 0.0086 |
| 72 | 0.0388 | 0.0340 | 0.0296 | 0.0258 | 0.0215 | 0.0329 | 0.0443 | 0.0131 |
| 77 | 0.0605 | 0.0536 | 0.0472 | 0.0425 | 0.0400 | 0.0531 | 0.0683 | |
| 82 | 0.0937 | 0.0860 | 0.0787 | 0.0736 | 0.0689 | 0.0866 | 0.1024 | |
| 87 | 0.1404 | 0.1336 | 0.1263 | 0.1210 | 0.1231 | 0.1352 | 0.1509 | |
| 92 | 0.2162 | 0.1999 | 0.1910 | 0.1713 | 0.1912 | 0.2087 | 0.2160 | |
| **Female** | | | | | | | | |
| 57 | 0.0058 | 0.0065 | 0.0052 | 0.0027 | 0.0050 | 0.0057 | 0.0067 | 0.0028 |
| 62 | 0.0099 | 0.0088 | 0.0072 | 0.0101 | 0.0075 | 0.0089 | 0.0108 | 0.0033 |
| 67 | 0.0143 | 0.0121 | 0.0112 | 0.0112 | 0.0084 | 0.0130 | 0.0166 | 0.0043 |
| 72 | 0.0204 | 0.0197 | 0.0179 | 0.0181 | 0.0159 | 0.0198 | 0.0252 | 0.0077 |
| 77 | 0.0340 | 0.0319 | 0.0304 | 0.0300 | 0.0215 | 0.0330 | 0.0393 | |
| 82 | 0.0581 | 0.0537 | 0.0519 | 0.0479 | 0.0422 | 0.0566 | 0.0632 | |
| 87 | 0.0975 | 0.0928 | 0.0848 | 0.0903 | 0.0679 | 0.0962 | 0.1051 | |
| 92 | 0.1679 | 0.1463 | 0.1441 | 0.1610 | 0.0571 | 0.1655 | 0.1698 | |

### TABLE 4
### Ratios of Mortality Rates by Amount of Indexed Final Salary to Average Mortality Rate for CSRS Annuitants, for Each Age Group (Also Includes Ratios of Mortality Rate for Life Tables for U.S. Social Security Area—1990 and for CSRS Active Employees)

| | Indexed Monthly Annuity 1994 dollars | | | | | Social Security | Active Employee |
|---|---|---|---|---|---|---|---|
| Age group | <$30K | $30-40K | $40-60K | $60-80K | >$80K | | |
| **Male** | | | | | | | |
| 55-59 57 | 1.447 | 1.168 | 0.907 | 0.763 | 0.690 | 1.438 | 0.572 |
| 60-64 62 | 1.316 | 1.106 | 0.898 | 0.739 | 0.639 | 1.371 | 0.483 |
| 65-69 67 | 1.262 | 1.054 | 0.886 | 0.756 | 0.670 | 1.373 | 0.396 |
| 70-74 72 | 1.181 | 1.034 | 0.900 | 0.785 | 0.653 | 1.349 | 0.398 |
| 75-79 77 | 1.140 | 1.011 | 0.890 | 0.800 | 0.754 | 1.286 | |
| 80-84 82 | 1.082 | 0.993 | 0.910 | 0.851 | 0.796 | 1.183 | |
| 85-89 87 | 1.038 | 0.988 | 0.935 | 0.895 | 0.910 | 1.116 | |
| 90-94 92 | 1.036 | 0.958 | 0.915 | 0.821 | 0.916 | 1.035 | |
| **Female** | | | | | | | |
| 55-59 57 | 1.017 | 1.132 | 0.900 | 0.477 | 0.867 | 1.175 | 0.480 |
| 62 | 1.107 | 0.988 | 0.804 | 1.135 | 0.838 | 1.204 | 0.373 |
| 67 | 1.097 | 0.927 | 0.856 | 0.861 | 0.646 | 1.275 | 0.329 |
| 72 | 1.027 | 0.993 | 0.903 | 0.912 | 0.802 | 1.267 | 0.388 |
| 77 | 1.030 | 0.965 | 0.920 | 0.909 | 0.652 | 1.189 | |
| 82 | 1.026 | 0.948 | 0.917 | 0.847 | 0.746 | 1.117 | |
| 87 | 1.013 | 0.964 | 0.881 | 0.938 | 0.706 | 1.092 | |
| 92 | 1.015 | 0.884 | 0.871 | 0.973 | 0.345 | 1.026 | |

### TABLE 5
### Ratio of Mortality Rate for Each Annuity Amount/Final Salary Grouping to Overall Mortality Rate for that Age

| | Indexed Final Salary Range | | | | | |
|---|---|---|---|---|---|---|
| Monthly Annuity | <$30K | $30-40K | $40-60K | $60-80K | >$80K | Average |
| | | | Male Lives | | | |
| **Under Age 76** | | | | | | |
| <$1,000 | 1.284 | 1.183 | 1.030 | 0.913 | 0.694 | 1.217 |
| $1,000-$1,500 | 1.309 | 1.131 | 1.017 | 1.020 | 0.681 | 1.169 |
| $1,500-$2,000 | 1.049 | 1.035 | 0.965 | 0.878 | 0.909 | 1.014 |
| $2,000-$3,000 | 0.451 | 0.835 | 0.868 | 0.809 | 0.714 | 0.847 |
| >$3,000 | — | 0.882 | 0.685 | 0.704 | 0.642 | 0.684 |
| **Average** | **1.244** | **1.073** | **0.896** | **0.760** | **0.661** | **1.000** |
| **Over Age 75** | | | | | | |
| <$1,000 | 1.186 | 1.081 | 0.977 | 1.021 | 0.922 | 1.144 |
| $1,000-$1,500 | 1.192 | 1.095 | 0.927 | 0.831 | 0.798 | 1.139 |
| $1,500-$2,000 | 1.002 | 1.049 | 1.048 | 0.876 | 0.774 | 1.021 |
| $2,000-$3,000 | 0.714 | 0.888 | 0.944 | 0.897 | 0.869 | 0.890 |
| >$3,000 | — | 0.406 | 0.768 | 0.800 | 0.760 | 0.769 |
| **Average** | **1.100** | **1.004** | **0.900** | **0.822** | **0.778** | **1.000** |

*Table 5 continued on page 10*

### TABLE 5—*Continued*
### Ratio of Mortality Rate for Each Annuity Amount/Final Salary Grouping to Overall Mortality Rate for that Age

| | Indexed Final Salary Range | | | | | |
|---|---|---|---|---|---|---|
| **Monthly Annuity** | **<$30K** | **$30-40K** | **$40-60K** | **$60-80K** | **>$80K** | **Average** |
| **Female Lives** | | | | | | |
| **Under Age 76** | | | | | | |
| <$1,000 | 1.051 | 1.004 | 0.866 | 0.670 | 0.795 | 1.037 |
| $1,000-$1,500 | 1.109 | 0.966 | 0.791 | 0.578 | 0.479 | 1.025 |
| $1,500-$2,000 | 1.010 | 0.993 | 0.872 | 0.766 | 0.640 | 0.960 |
| $2,000-$3,000 | 0.579 | 0.891 | 0.882 | 1.021 | 0.722 | 0.890 |
| >$3,000 | — | 1.756 | 0.793 | 0.838 | 0.804 | 0.829 |
| **Average** | **1.067** | **0.978** | **0.859** | **0.886** | **0.766** | **1.000** |
| **Over Age 75** | | | | | | |
| <$1,000 | 1.051 | 0.932 | 1.168 | 1.049 | 0.328 | 1.041 |
| $1,000-$1,500 | 1.047 | 0.953 | 0.912 | 0.955 | 0.567 | 1.027 |
| $1,500-$2,000 | 0.911 | 1.016 | 0.888 | 1.018 | 0.741 | 0.951 |
| $2,000-$3,000 | 0.666 | 0.930 | 0.944 | 0.951 | 0.743 | 0.902 |
| >$3,000 | — | 0.515 | 0.813 | 0.844 | 0.706 | 0.797 |
| **Average** | **1.024** | **0.958** | **0.915** | **0.893** | **0.681** | **1.000** |

### TABLE 6
### Total Exposure for Each Annuity Amount/Final Salary Grouping

| | Indexed Final Salary Range | | | | | |
|---|---|---|---|---|---|---|
| **Monthly Annuity** | **<$30K** | **$30-40K** | **$40-60K** | **$60-80K** | **>$80K** | **Total** |
| **Male Lives** | | | | | | |
| **Under Age 76** | | | | | | |
| <$1,000 | 273,317 | 265,206 | 39,403 | 3,611 | 2,025 | 583,562 |
| $1,000-$1,500 | 338,805 | 685,083 | 116,230 | 10,656 | 3,892 | 1,154,666 |
| $1,500-$2,000 | 142,063 | 749,798 | 326,427 | 29,177 | 5,443 | 1,252,908 |
| $2,000-$3,000 | 6,793 | 168,398 | 732,904 | 185,846 | 23,288 | 1,117,229 |
| >$3,000 | — | 863 | 100,504 | 284,051 | 148,580 | 533,998 |
| **Total** | **760,978** | **1,869,348** | **1,315,468** | **513,341** | **183,228** | **4,642,363** |
| **Over Age 75** | | | | | | |
| <$1,000 | 166,653 | 63,790 | 14,619 | 2,547 | 1,492 | 249,101 |
| $1,000-$1,500 | 207,972 | 86,033 | 23,967 | 4,287 | 2,093 | 324,352 |
| $1,500-$2,000 | 185,089 | 140,788 | 33,893 | 5,866 | 2,276 | 367,912 |
| $2,000-$3,000 | 40,447 | 130,668 | 137,443 | 14,542 | 4,268 | 327,368 |
| >$3,000 | — | 6,954 | 96,798 | 88,721 | 35,227 | 227,700 |
| **Total** | **600,161** | **428,233** | **306,720** | **115,963** | **45,356** | **1,496,433** |
| **Female Lives** | | | | | | |
| **Under Age 76** | | | | | | |
| <$1,000 | 404,154 | 111,884 | 10,066 | 608 | 331 | 527,043 |
| $1,000-$1,500 | 227,486 | 172,428 | 35,439 | 898 | 265 | 436,516 |
| $1,500-$2,000 | 44,051 | 126,513 | 66,805 | 2,121 | 277 | 239,767 |
| $2,000-$3,000 | 1,180 | 34,590 | 97,400 | 9,608 | 1,304 | 144,082 |
| >$3,000 | — | 116 | 11,559 | 13,248 | 4,182 | 29,105 |
| **Total** | **676,871** | **445,531** | **221,269** | **26,483** | **6,359** | **1,376,513** |
| **Over Age 75** | | | | | | |
| <$1,000 | 262,816 | 27,919 | 2,623 | 352 | 124 | 293,834 |
| $1,000-$1,500 | 172,080 | 37,116 | 4,776 | 394 | 138 | 214,504 |
| $1,500-$2,000 | 65,670 | 48,136 | 8,551 | 607 | 140 | 123,104 |
| $2,000-$3,000 | 9,746 | 39,553 | 26,763 | 1,481 | 330 | 77,873 |
| >$3,000 | — | 1,572 | 11,651 | 4,922 | 1,226 | 19,371 |
| **Total** | **510,312** | **154,296** | **54,364** | **7,756** | **1,958** | **728,686** |

8,243,995